

(b) said form cutter includes a form cutter shaft configured to fit within said shaft support of said housing.

28. The device of claim 25, wherein said at least one milling surface is configured such that it is operated in a plane generally parallel to the surface contour formed in one of the adjacent vertebral bodies as said form cutter is moved by said drive means.

29. The device of claim 25, wherein said housing includes:

- (a) an upstanding wall;
- (b) a shaft support; and
- (c) <sup>NM</sup> a slot configured through said upstanding wall through which said drive means is operatively coupled to said form cutter.

30. The device of claim 25 including drive means that operatively couples said form cutter to said drive source.

31. The device of claim 30, wherein:

- (a) said drive means comprises a drive shaft having a proximal end and a distal end;
- (b) said drive shaft is adapted to be received in said elongated shaft portion;
- (c) the distal end of said drive shaft is operatively coupled to said form cutter to move said form cutter; and
- (d) the proximal end of said drive shaft is operatively coupled to said drive source.

32. The device of claim 25, wherein said drive means is disposed at least in part in said elongated shaft portion.

33. The device of claim 25, wherein:

- (a) the device includes a drive shaft disposed within said elongated shaft portion;
- (b) said drive shaft is rotatably driven by said drive source;
- (c) said drive shaft has a gear at its distal end; and

(d) said gear is configured to mate with corresponding teeth on said form cutter.

34. The device of claim 33, wherein:

- (a) said form cutter includes at least one top milling surface and a bottom surface;
- (b) said bottom surface is provided with a beveled gearing surface;
- (c) said beveled gearing surface engages teeth on said gear; and
- (d) said gear and said beveled gearing surface cooperate to rotate said form cutter as said drive shaft is rotatably driven.

35. The device of claim 25, wherein said form cutter is driven in rotary motion by said drive means.

36. The device of claim 25, wherein said form cutter comprises at least two milling surfaces for simultaneously creating at least two predetermined surface contours on an end plate of one of the adjacent vertebral bodies.

37. The device of claim 25, wherein:

- (a) said housing includes a smooth surface formed on a side of said housing opposite said milling surface; and
- (b) said smooth surface is configured to allow a surgeon to increase the pressure of said milling surface against the one of the adjacent vertebral bodies.

38. The device of claim 25, wherein said form cutter includes a leading edge configured as a bone cutting surface.

39. The device of claim 36, wherein at least one of said at least two milling surfaces of said form is convex.

40. The device of claim 36, wherein at least one of said at least two milling surfaces of said form cutter is tapered outwardly from a front surface of said form cutter.

41. A form cutter for preparing a space between adjacent vertebral bodies to receive an insert, said form cutter having:

- (a) at least one milling surface and being mountable on a device capable of moving said form cutter to cause said at least one milling surface to create at least one surface having a predetermined contour in an end plate of at least one of the adjacent vertebral bodies,
- (b) said at least one milling surface having a width selected to substantially match the overall width of the insert to be received between the adjacent vertebral bodies,
- (c) said at least one milling surface being configured and oriented such that it is generally parallel to the surface having a predetermined contour created in the end plate of the adjacent vertebral body when in use.

42. The form cutter of claim 41, wherein said form cutter has a top surface and a bottom surface.

43. The form cutter of claim 42, wherein at least one of said top surface and said bottom surface is a milling surface.

44. The form cutter of claim 41, wherein said form cutter has a leading edge configured to cut into the vertebral body as said form cutter is inserted into the spine.

45. The form cutter of claim 42, wherein at least one of said top surface and said bottom surface of said form cutter comprises a convex surface.

46. The form cutter of claim 42, wherein at least one area of said top surface and said bottom surface of said form cutter is tapered outwardly from the front surface of said form cutter.

47. A device for preparing a space in a human spine across a disc space and into the end plates of adjacent vertebral bodies to receive an interbody spinal insert, said device comprising:

- (a) an elongated shaft portion;
- (b) a housing disposed at the distal end of said elongated shaft portion;
- (c) a drive means;

- (d) a drive source for powering said drive means;
- (e) a form cutter mountable on said housing; and
- (f) a coupling means for connecting and imparting motion from said drive means to said form cutter,

wherein:

- (g) said form cutter has at least one broad milling surface selected to remove bone from and create a predetermined surface contour in at least one of the end plates of the adjacent vertebral bodies as said form cutter is moved by said drive means; and
- (h) said milling surface is configured to substantially match in width and contour a surface of the interbody spinal insert and the predetermined surface contour in at least one of the end plates of the adjacent vertebral bodies.

48. The device of claim 47, wherein:

- (a) said drive means moves said form cutter in a plane generally parallel to the predetermined surface contour to be formed in at least one of the end plates of the adjacent vertebral bodies; and
- (b) the movement of said form cutter is rotary.

49. A device for preparing a space to receive an interbody insert within and between the adjacent surfaces of vertebral bodies disposed adjacent a disc space, said device comprising:

- (a) an elongated shaft containing at least a portion of a drive means;
- (b) a housing positioned at the distal end of said elongated shaft portion; and
- (c) a form cutter disposed on said housing and operably connected to said drive means to be driven thereby,

wherein:

- (d) said form cutter has a milling surface;
- (e) said milling surface has a width substantially the same as the width of the insert to be implanted;
- (f) said milling surface has a configuration adapted to remove bone from the vertebral bodies to prepare the vertebral bodies to receive the insert; and
- (g) said milling surface of said form cutter is configured to be generally parallel to a receiving

surface that is formed on one of the vertebral bodies by said device.

50. The device of claim 49, wherein said form cutter includes first and second outwardly facing milling surfaces. NM

51. ~~The device of claim 49, wherein the width of said milling surface substantially matches the width of the nucleus pulposus of a disc space in which said milling surface is inserted.~~ NM

52. The device of claim 49, wherein said form cutter has at least one milling surface having a convex configuration.

53. The device of claim 49, wherein:

- (a) said form cutter includes outwardly facing first and second milling surfaces; and NM  
(b) said outwardly facing first and second milling surfaces are inclined relative to one another. NM

54. The device of claim 50, wherein said outwardly facing first and second milling surfaces are inclined with respect to each other. NM

55. The device of claim 49, wherein said drive means is adapted to produce a rotary movement of said form cutter about an axis generally perpendicular to a longitudinal axis of said elongated shaft portion and a general plane of the vertebral end plate.

56. The device of claim 49, wherein said drive means is powered by a drive source.

57. The device of claim 49, wherein said housing has a surface opposite said milling surface of said form cutter for bearing against the vertebral body on the opposite side of the disc space. NM

58. The device of claim 57, wherein said bearing surface is smooth. NM

59. The device of claim 49, wherein said device is sterilizable for use in surgery. NM

60. The device of claim 49, wherein said form cutter is detachable from said housing.

61. The device of claim 49, including a rotatable drive shaft disposed within said elongated shaft portion, said rotatable drive shaft being operably connected to said drive means and to said form cutter.

62. A method for preparing the disc space between adjacent vertebrae of a human spine to receive an insert therebetween, said method being performed with a device having a movable form cutter with a milling surface that has a width substantially the same as the width of the insert to be implanted between the adjacent vertebrae, said method comprising the steps of:

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- (a) activating the device to cause the milling surface to move;
- (b) inserting the milling surface into the space between the adjacent vertebrae;
- (c) contacting the milling surface of the form cutter against at least one of the adjacent vertebrae to remove bone from the end plate of the vertebra that lies adjacent the disc space to form a surface of that vertebra, the surface of that vertebra having a contour that substantially matches the contour of a surface of the insert to be implanted and that substantially matches the contour of the milling surface; and
- NM
- (d) moving the milling surface of the form cutter in a rotary fashion relative to said device in a plane generally parallel to the surface contour to be formed in at least one of the adjacent vertebral bodies.

63. The method of claim 62, wherein the form cutter includes first and second outwardly facing milling surfaces.

64. The method of claim 63, wherein the device is not activated until after the milling surface has been inserted into the space between the adjacent vertebrae.

65. The method of claim 62, including the steps of:

- (a) measuring the width of the desired space to be formed between the adjacent vertebrae; and
- (b) selecting a form cutter and corresponding milling surface that matches the measured width.

66. The method of claim 63, including the further steps of:

- MA
- (a) removing the milling surface from the disc space after completing the contacting step; and then
  - (b) positioning an insert into the space created between the adjacent vertebrae.

67. A device for preparing a space in the human spine to receive an insert between adjacent vertebral bodies, said device comprising:

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- (a) an elongated shaft portion;
  - (b) a housing disposed at the distal end of said elongated shaft portion;
  - (c) a drive means;
  - (d) a drive source operably connected to said drive means;
  - (e) a form cutter mountable on said housing and movable by said drive means;
  - (f) said form cutter having at least one milling surface selected to create a predetermined surface contour in one of the adjacent vertebral bodies as said form cutter is moved by said drive means;
  - (g) said drive means including a drive shaft disposed within said elongated shaft portion;
  - (h) said drive shaft being rotatably driven by said drive means; and
  - (i) said drive shaft being operably coupled to said form cutter.

68. The device of claim 67, wherein

- M M
- (a) said form cutter includes first and second milling surfaces;
  - (b) said drive shaft has a gear at its distal end NM
  - (c) said gear is configured to engage corresponding teeth on said form cutter;
  - (d) said gear and said teeth are configured such that said form cutter having said first and second milling surfaces is rotated as said drive shaft is rotated by said drive means.

69. The device of claim 67, wherein said housing is fixedly connected to said elongated shaft portion.

70. The device of claim 67, wherein:

- ✱
- (a) said housing includes a shaft support; and
  - (b) said form cutter includes a form cutter-shaft configured to fit within said shaft support of said housing.

71. The device of claim 67, wherein said at least one milling surface is configured such that it is operated in a plane generally parallel to the surface contour formed in one of the adjacent vertebral bodies as said form cutter is moved by said drive means.

72. The device of claim 67, wherein said housing includes:

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- (a) an upstanding wall;
  - (b) a shaft support; and
  - (c) <sup>NM</sup> a slot configured through said upstanding wall through which said drive means is operatively coupled to said form cutter.

73. The device of claim 67 including drive means that operatively couples said form cutter to said drive source.

74. The device of claim 73, wherein:

- (a) said drive means comprises a drive shaft having a proximal end and a distal end;
- (b) said drive shaft is adapted to be received in said elongated shaft portion;
- (c) the distal end of said drive shaft is operatively coupled to said form cutter to move said form cutter; and
- (d) the proximal end of said drive shaft is operatively coupled to said drive source.

75. The device of claim 67, wherein said drive means is disposed at least in part in said elongated shaft portion.

76. The device of claim 67, wherein said form cutter is driven in rotary motion by said drive means.



MM 77. The device of claim 67, wherein said form cutter comprises at least two milling surfaces for simultaneously creating at least two predetermined surface contours on an end plate of one of the adjacent vertebral bodies.

78. The device of claim 67, wherein:

(a) said housing includes a smooth surface formed on a side of said housing opposite said milling surface; and

MM (b) said smooth surface is configured to allow a surgeon to increase the pressure of said milling surface against the one of the adjacent vertebral bodies.

79. The device of claim 67, wherein said form cutter includes a leading edge configured as a bone cutting surface.

Sub E7 80. The device of claim 68, wherein at least one of said at least two milling surfaces of said form is convex.

81. The device of claim 68, wherein at least one of said at least two milling surfaces of said form cutter is tapered outwardly from a front surface of said form cutter.

82. A device for preparing a space in a human spine to receive an insert between adjacent vertebral bodies, said device comprising:

(a) an elongated shaft portion;

(b) a housing disposed at the distal end of said elongated shaft portion;

(c) a drive means;

(d) a drive source operably connected to said drive means;

(e) a form cutter mountable on said housing and movable by said drive means, wherein:

(f) said form cutter has at least one milling surface selected to create a predetermined surface contour in one of the adjacent vertebral bodies as said form cutter is moved by said drive means; and

(g) said housing has a smooth surface formed on a side of said housing opposite said milling surface.

83. The device of claim 82, wherein said housing is fixedly connected to said elongated shaft portion.

84. The device of claim 82, wherein:

- (a) said housing includes a shaft support; and
- (b) said form cutter includes a form cutter shaft configured to fit within said shaft support of said housing.

85. The device of claim 82, wherein said at least one milling surface is configured such that it is operated in a plane generally parallel to the surface contour formed in one of the adjacent vertebral bodies as said form cutter is moved by said drive means.

86. The device of claim 82, wherein said housing includes:

- (a) an upstanding wall;
- (b) a shaft support; and
- (c) a slot configured through said upstanding wall through which said drive means is operatively coupled to said form cutter. *N M*

87. The device of claim 82 including drive means that operatively couples said form cutter to said drive source.

88. The device of claim 87, wherein:

- (a) said drive means comprises a drive shaft having a proximal end and a distal end;
- (b) said drive shaft is adapted to be received in said elongated shaft portion;
- (c) the distal end of said drive shaft is operatively coupled to said form cutter to move said form cutter; and
- (d) the proximal end of said drive shaft is operatively coupled to said drive source.

89. The device of claim 82, wherein said drive means is disposed at least in part in said elongated shaft portion.

90. The device of claim 82, wherein:

- (a) the device includes a drive shaft disposed within said elongated shaft portion;
- (b) said drive shaft is rotatably driven by said drive source;
- (c) said drive shaft has a gear at its distal end; and
- (d) said gear is configured to mate with corresponding teeth on said form cutter.

91. The device of claim 90, wherein:

- (a) said form cutter has at least one top milling surface and a bottom surface;
- (b) said bottom surface is provided with a beveled gearing surface;
- (c) said beveled gearing surface engages teeth on said gear; and
- (d) said gear and said beveled gearing surface cooperate to rotate said form cutter as said drive shaft is rotatably driven by said drive means.

92. The device of claim 82, wherein said form cutter is driven in rotary motion by said drive means.

93. The device of claim 82, wherein said form cutter comprises at least two milling surfaces for simultaneously creating at least two predetermined surface contours on an end plate of one of the adjacent vertebral bodies.

94. The device of claim 93, wherein said form cutter includes a leading edge configured as a bone cutting surface. W M

95. The device of claim 93, wherein at least one of said at least two milling surfaces of said form is convex. M M

96. The device of claim 93, wherein at least one of said at least two milling surfaces of said form cutter is tapered outwardly from a front surface of said form cutter. N M

97. A device for preparing a space in a human spine to receive an insert between adjacent

vertebral bodies, said device comprising:

- (a) an elongated shaft portion;
- (b) a housing disposed at the distal end of said elongated shaft portion;
- (c) a drive means;
- (d) a drive source operably connected to said drive means; and
- (e) a form cutter mountable on said housing and movable by said drive means, wherein:
- (f) said form cutter has at least one milling surface selected to create a predetermined surface contour in one of the adjacent vertebral bodies as said form cutter is moved by said drive means.

98. The device of claim 97, wherein said form cutter has at least two milling surfaces.

99. The device of claim 98, wherein said form cutter includes a leading edge configured as a bone cutting surface.

100. The device of claim 97, wherein said housing is fixedly connected to said elongated shaft portion.

101. The device of claim 97, wherein:

- (a) said housing includes a shaft support; and
- (b) said form cutter includes a form cutter shaft configured to fit within said shaft support of said housing.

102. The device of claim 97, wherein said at least one milling surface is configured such that it is operated in a plane generally parallel to the surface contour formed in one of the adjacent vertebral bodies as said form cutter is moved by said drive means.

103. The device of claim 97, wherein said housing includes:

- (a) an upstanding wall;
- (b) a shaft support; and
- (c) a slot configured through said upstanding wall through which said drive means is operatively

coupled to said form cutter.

104. The device of claim 97 including drive means that operatively couples said form cutter to said drive source.

105. The device of claim 104, wherein:

- (a) said drive means comprises a drive shaft having a proximal end and a distal end;
- (b) said drive shaft is adapted to be received in said elongated shaft portion;
- (c) the distal end of said drive shaft is operatively coupled to said form cutter to move said form cutter; and
- (d) the proximal end of said drive shaft is operatively coupled to said drive source.

106. The device of claim 97, wherein said drive means is disposed at least in part in said elongated shaft portion.

107. The device of claim 97, wherein:

- (a) the device includes a drive shaft disposed within said elongated shaft portion;
- (b) said drive shaft is rotatably driven by said drive source;
- (c) said drive shaft has a gear at its distal end; and *MM*
- (d) said gear is configured to mate with corresponding teeth on said form cutter.

108. The device of claim 107, wherein:

- (a) said form cutter has at least one top face having first and second milling surfaces and a bottom surface;
- (b) said bottom surface is provided with a beveled gearing surface;
- (c) said beveled gearing surface engages teeth on said gear; and *MM*
- (d) said gear and said beveled gearing surface cooperate to rotate said form cutter as said drive shaft is rotatably driven by said drive means.

109. The device of claim 97, wherein said form cutter is driven in rotary motion by said drive

means.

110. The device of claim 97, wherein said form cutter comprises at least two milling surfaces for simultaneously creating at least two predetermined surface contours on an end plate of one of the adjacent vertebral bodies. MM

111. The device of claim 97, wherein said housing includes a smooth surface formed on a side of said housing opposite said milling surface, said smooth surface being configured to allow a surgeon to increase the pressure of said milling surface against the one of the adjacent vertebral bodies. NM

112. The device of claim 97, wherein at least one of said at least two milling surfaces of said form is convex. NM

113. The device of claim 97, wherein at least one of said at least two milling surfaces of said form cutter is tapered outwardly from a front surface of said form cutter. NM

114. A form cutter for preparing a space between adjacent vertebral bodies to receive an insert, said form cutter having:

(a) at least one milling surface and being mountable on a device capable of moving said form cutter to cause said at least one milling surface to create at least one surface having a predetermined contour in an end plate of at least one of the adjacent vertebral bodies;

(b) said at least one milling surface having a width selected to substantially match the overall width of the insert to be received between the adjacent vertebral bodies; MM

(c) said at least one milling surface having a perimeter that is at least in part arcuate; and

(d) said form cutter having a leading edge configured to cut into the vertebral body as said form cutter is inserted into the spine. MM

115. The form cutter of claim 114, wherein said form cutter has a top surface and a bottom surface.

116. The form cutter of claim 115, wherein at least one of said top surface and said bottom surface comprises at least one milling surface. M M

117. The form cutter of claim 115, wherein at least one of said top surface and said bottom surface of said form cutter comprises at least one milling surface that is convex.

118. The form cutter of claim 115, wherein at least one of said top surface and said bottom surface of said form cutter comprises at least one milling surface that is tapered outwardly from the front surface of said form cutter. ~~118~~

119. The form cutter of claim 114, said at least one milling surface being configured and oriented such that it is generally parallel to the surface having a predetermined contour created in the end plate of the at least one of the adjacent vertebral bodies when in use.

120. A device for preparing a space in a human spine across a disc space and into the end plates of adjacent vertebral bodies to receive an interbody spinal insert, comprising:

- (a) an elongated shaft portion;
- (b) a housing disposed at the distal end of said elongated shaft portion;
- (c) a drive means;
- (d) a drive source operably connected to said drive means;
- (e) a form cutter mountable on said housing and movable by said drive means;
- (f) drive means that operatively couples said form cutter to said drive source to move said form cutter; M M
- (g) said form cutter having a broad milling surface selected to remove bone from and create a predetermined surface contour in at least one of the end plates of the adjacent vertebral bodies as said form cutter is moved by said drive means in a plane generally parallel to the predetermined surface contour to be formed in said vertebral body;
- (h) said form cutter being driven in rotary motion by said drive means; and
- (i) said milling surface being configured to substantially match in width and contour a surface of said interbody spinal insert. 9

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121. A form cutter for preparing a space between adjacent vertebral bodies to receive an insert, said form cutter having:

- (a) at least one top milling surface for removing bone;
- (b) A bottom surface opposite said at least one top milling surface adapted to mount on a device capable of moving said form cutter;
- (c) said at least one top milling surface of said moving form cutter being capable of removing bone from an end plate of at least one of said adjacent vertebral bodies to create at least one surface in said end plate having a predetermined contour;
- (d) said at least one top milling surface having a width selected to substantially match the overall width of said insert to be received between said adjacent vertebral bodies; and
- (e) said form cutter having a leading edge configured to cut into the vertebral body as said form cutter is inserted into the spine.

122. The form cutter of claim 121, wherein said top surface of said form cutter is capable of milling bone.

123. The form cutter of claim 121, wherein at least one milling surface provided on said top surface of said form cutter is convex.

124. The form cutter of claim 121, wherein at least one milling surface provided on said top surface of said form cutter is tapered outwardly from the front surface of said form cutter.

125. The form cutter of claim 121, wherein said at least one milling surface is configured and oriented such that it is generally parallel to the surface formed in said end plate of said vertebral body when in use.--